UNIVERSITY OF GONDAR
FACULTY OF VETERINARY MEDICINE

ASSESSMENT ON THE IMPACT OF IMPROVED HARNESS IN THE CONTROL OF BACK SORE IN DONKEYS AROUND BAHIR DAR CITY

DVM THESIS

BY

JEMAL ENDRISS MOSA

JUNE, 2015

GONDAR, ETHIOPIA

UNIVERSITY OF GONDAR
FACULTY OF VETERINARY MEDICINE

ASSESSMENT ON THE IMPACT OF IMPROVED HARNESS IN THE CONTROL OF BACK SORE IN DONKEYS AROUND BAHIR DAR CITY

A thesis submitted to the Faculty of Veterinary Medicine, University of Gondar in partial fulfillment of the requirements for the degree of Doctor of Veterinary Medicine

BY

JEMAL ENDRISS MOSA

JUNE, 2015

GONDAR, ETHIOPIA

ASSESSMENT ON THE IMPACT OF IMPROVED HARNESS IN THE CONTROL OF BACK SORE IN DONKEYS AROUND BAHIR DAR CITY

BY

JEMAL ENDRISS MOSA

Board of external examiners	**signature**
1. Prof Abebaw Gashaw School of vet med, Jimma university	_____
2. Prof Tadelle Tolla School of vet med, Jimma university	_____
3. Gelagay Ayelet (Assoc Prof) National Veterinary institute /NVI/, Ethiopia	_____
4. Dr Fufa Dawo (Assoc Prof) FVM, Addis Ababa University	_____
5. Dr Ahimed Yassin (Assoc Prof) FVM, Wollo University	_____
6. Dr Dessie Shiferaw (Assoc Prof) FVM, Hawasa University	_____

Adviser Name and Signature

1. **Mersha Chanie (DVM, MSc; Associate professor of Pathology)**
2. **Tewodros Tesfaye (DVM, MSc; Assistant Professor of Physiology)**
3. **Girma Birhan (DVM, MSc Candidate)**

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

page

LIST OF ABBREVIATIONS

BCS	Body condition scoring
CI	Confidence interval
DACA	Drug administration and central authority of Ethiopia
N	Number of animals
OR	Odds ratio
P	P-value
SPSS	Statistical package for the social sciences
χ^2	Chi-square

ACKNOWLEDGEMENT

First and for most, praise be to God. The most Gracious, the most Merciful, the self sufficient master, whom all creatures need.

Next I have a special gratitude to Dr Mersha Chanie and Dr Tewodros Tesfaye for their unreserved and steady guidance, meticulous correction, and valuable suggestion.

My special thanks go to The Donkey Sanctuary Ethiopia, Amhara project and its staff members for their cooperation in the provision of materials and technical support, constructive criticism and constant encouragement throughout the study time.

The last but not the least gratefulness will go to all my family members for their moral and financial support as well as their love, to which the power may allow me to act for their gratefulness. Finally, my deepest gratitude goes to all my friends (especially Girma Birhan, DVM, MSC candidate and Yitayal Gebrie, DVM) who have been with me during the good and bad time.

The efforts of all the above people and many others have been essential in bringing this thesis to completion, yet all imperfection remains mine alone, to all my sincere thanks.

ABSTRACT

Across sectional study was conducted from October 2014 to April 2015 on randomly selected working donkeys to assess the impact of improved harness in the control of back sore around Bahir Dar city (Meshenti and Yigodi). Study animals were selected randomly. The risk factors site, sex, age, body condition scores, condition and design of packsaddle, working nature (load weight and length of journey) were assessed through Questionnaire Survey and physical clinical examination from a total of 384 working donkeys. The overall prevalence of wound 13.5% (n=52) were found. The occurrence didn't significant among sex, BCS and working nature of the animal ($p>0.05$). However, the occurrence of wound vary significantly twice in Meshenti than in Yigodi (x^2=5.2, p=0.023 and OR=2.105). Among age group (χ^2= 6.832, $p < 0.05$). Higher prevalence was noticed in adult animals (15.3%) than old (6.9%), and young ones (0.00%). Substantial wound prevalence were detected from donkeys with ill signs than healthy donkeys (x^2=11.857, p=0.001 and OR=2.96). More specifically, prevalence of back sore considerably associated with condition of saddling (11.7%, n=45, x^2= 10.771 and $p< 0.05$) and donkeys which are used with insufficient (15.3%, n=189) or without any saddle (27.3%, n=11) were almost at a greater risk of twice and three times respectively having back sore (x^2=9.094, p=0.010) than those used with proper saddle (7.1%, n=184). When donkeys get wounded (47.6%, n=180) were treated by their owners or by traditional wound healers in the village, but others (52.4%, n=204) were treated in veterinary clinics. Community perception about the improved packsaddle designed by The Donkey Sanctuary Ethiopia, Amhara Project were positive regards to the reduction of back sore, comfort to the donkeys and affordable price. In general, the study has clearly indicated back sore as a prevailing welfare problem of working donkeys around Bahir Dar city.

Key words:- *Donkeys, Meshenti, Yigodi, Prevalence, Back sore, pack saddle,*

1. INTRODUCTION

Equines are widely distributed throughout the world. In developed countries, small numbers are kept as pets, as companions, or for work, in occupational therapy program. There are an estimated 90 million equines in the developing world, with highest population concentration in Central Asia and North and East Africa. Over 95% of all donkeys and mules and 60% of all horses are found in developing countries, where they are kept mainly for work (Girma *et al.*, 2014).

In Ethiopia more than half of the human population is dependent on the power provided by draft animals, 90 million of which are equines. With entire extended families often dependent on the working capacity of just one equine, human welfare and animal welfare are inextricably linked. Sadly, constraints such as poverty and lack of knowledge mean that animal welfare is being compromised internationally (Girma *et al.*, 2014).

Animals are "sentient beings" that experience states such as pain, suffering and satisfaction, thus they are reckoned as having fine condition of welfare whenever they are in good physical shape and health, secure, providing with sufficient feed, allowed to exercise natural activities and being afflicted with throbbing, trepidation and misery. Avoidance and management of pain and anguish in animals are commonly considered as ethical necessities in scientific researches and teaching. Hence, high-quality animal welfare entails appropriate disease prevention and veterinary cure, suitable sanctuary, management, nourishment, gentle handling and benevolent slaughter (Girma *et al.*, 2014).

People in most peri-urban centers either own or rent horses, mules or donkeys to transport goods, people and even water. Despite their use, the husbandry practices of working equines are poor. Some hobbling methods cause discomfort and inflict wounds. In addition, inappropriate harnesses or yokes that may be heavy and ragged, long working hours and insufficient food, have a negative effect on the animals' health and welfare (Mekuria *et al.*, 2013). Harness development has long been identified and acknowledged as a problem area and one of significance in which little progress has been made. Owners, through necessity and without the skills and expertise required for successful harness manufacture, are left to their own devices in creating what they believe to be suitable harness using inappropriate materials (Anne *et al.*, 2003).

Most harness related injuries are avoidable. It is estimated that 70% of veterinary intervention in developing countries is in dealing with the symptoms of harness related injuries. The productivity of working equines can be vastly improved by the use of harness that is strong, comfortable and allows freedom of movement without the risk of injury. The donkey sanctuary measures, the effect of these problems or gaps on the donkey itself by using animal based welfare assessment tool with BCS, wound, lameness, behavior and other illnesses as the main indicators. It is hoped that in having a better understanding of draught animal harness and its function, many of the injuries endured by working animals could be alleviated (Anne *et al*., 2006).

Wound is an open mechanical injury of the skin (epidermis), underlying tissues and organs. It is characterized by pain, gaping, bleeding and functional disturbance (DACA, 2006). The type of wound in working donkeys includes tissue damage with or without blood/exudates/ pus, abscess formation, or any secondary bacterial complication. Bites (lacerated wounds) will be identified by irregular edges with underlying tissues removed as well as hemorrhage (Girma *et al.*, 2014).

Though equines provide several advantages, health and welfare is a visible problem, and most of the animal owners are not even aware of animal welfare and management practices; as a result animals have to undergo significant suffering due to improper handling, transport and husbandry practices. Studies to elucidate the magnitude of this problem are lacking. Such information would be useful for designing strategies that would help improve donkey health and welfare (Girma *et al.*, 2014).
Therefore, the current study was focused on assessment on the impact of improved harness in the control of back sore in donkeys around Bahir Dar city as well as associated risk factors. Therefore the objectives of this study were:

- To study the prevalence of back sore and its associated risk factors in donkeys
- To assess pack saddle use in donkeys

2. LITERATURE REVIEW

2. 1. Definition of harness

A harness is a system or a device that is fitted on the body of the working animal for several functions such as, to control the working animal, to transfer power from the animal to the attached implement, to hold in place any load carried, to act as a breaking system when pulling a cart (Anne *et al*., 2003).

2. 2 .Types of harness

2.2.1. The breast band harness

The breast band harness is a simple design and can be made from cheap and locally available materials. It can be adopted for various work activities such as pulling a cart or cultivation implement. It can be made from the following materials canvas belting materials, thick cotton webbing and leather. It is best that the harness be manufactured using locally available materials and skills. It is not necessary to use only one material. A mixture can be used, with the strongest for the breast strap and breeching and the lighter for the saddle straps and girths (Anne *et al*., 2003).

2.2.2. The collar harness

Collar harness may be classified as either full collar or split collar. The full collar harness is commonly used with horses and tends to be expensive. The split collar harness with two vertical hams joined at the top and bottom is more versatile and is widely used for donkeys and mules. The collar harness can be made the following materials wood, leather and metal. The collar harness has the disadvantage of being more complex in design than the breast band. The advantage of a collar harness is that it is good for work at high drought forces. It spreads the force of pulling over a wider surface of contact with the animal than a breast band harness. It can be fitted exactly in front of the shoulders on chest area and adjusted for comfort (Anne *et al*., 2003).

2.2.3. The pack saddle harness

The saddle harness enables donkeys, mules and horses to carry substantial loads on their backs. The saddle is usually made out of wood. It consists of two x-shaped pieces of wood, which have been attached to two oval support pads. Padding is used between the pack saddle and the animal's back. The harness may have three or four straps for belly, breast and hind quarters to keep it in place. The straps should be of leather, webbing or canvas (Anne *et al*., 2003).

2.3. Definition of Wound

Wound can be described as damage or harm caused to the structure of the body by an external or internal force which may be physical or chemical in nature (Owen *et al.*, 2012). Wounds can be accidental, due to violence, or iatrogenetically caused by surgeons. All wounds differ in degree, but nature of the wound is the same. A wound may be open, i.e. a break in the skin, or closed (Slatter, 2002). The donkey is liable to skin injury through its relatively exposed limbs and circumstances of its management (Svendsen, 2008). Wound is one of the commonest health concerns to afflict working donkeys in many countries (Stringer *et al*., 2010).

2.4. Classification of Wound

There is no inclusive classification for wound. But, wounds have been classified according to various criteria: anatomical localization (distal limb, carpus or tarsus, proximal limb, rump, head or neck) where Tesfaye and Curran (2005) have indicated back sore as commonly observed incident in donkeys of Ethiopia; time elapsed before presentation (<12 h, 12–24 h, >24 h, unknown); degree of contamination (subjective score on macroscopic appearance); depth (deepest point of the wound, i.e. skin, subcutis, muscle, periosteum, bone) and complications (open synovial cavities, lacerated or ruptured tendons). Limb wounds were defined as wounds located on the carpus, tarsus or distal limbs (Wilmink *et al.*, 2002). Although closed wound may not have disruption of the skin, underling tissue may be severely damaged by disruption of blood supply. Open wound may be further classified by duration and degree of contamination and by the cause and depth of the tissue (Waldron and Pope, 2002).

2.4.1.Graze/Abresion

A graze is a superficial denuding of the epidermis with minimal (capillary) bleeding and usually some serum/ plasma exudates, often in pin point form at first. It arises from abrasion against a rough or hard object such as a road surface (Knottenbelt, 2003; Elisabeth and Svendsen, 2008).

2.4.2. Bruising

Bruising is the result of bleeding and tissue destruction within and under the intact skin that causes damage to capillary beds or larger blood vessels. Bruising can occur in tissues adjacent to a laceration or without any outward injury. It may be difficult to detect skin bruising in equines because of the skin color and dense hair coat. The extent of bruising is variable, but where multiple significant bruise are from relatively trivial trauma then clotting parameters should be checked (Knottenbelt, 2003; Elisabeth and Svendsen, 2008).

Treatment is seldom required, but in some sites (eyelids or penis) ice packs or possibly cold hosing can be used to reduce local inflammation and control swelling, and minimize further damage to the skin. Healing is usually uneventful and with minimal scaring (Knottenbelt, 2003; Elisabeth and Svendsen, 2008).

2.4.3. Hematoma

It is accumulation of free blood under the skin. Hematoma can be differentiated from edema or inflammatory fluid by the finger press test. In the case of edema a finger pressed on to the swelling and the removed will leave an indent that remains visible for some minutes. If the swelling is inflammatory, there will probably be no pitting with pressure, in the case of hematoma the indentation will disappear immediately the finger is removed (Knottenbelt, 2003; Elisabeth and Svendsen, 2008).

Hematoma can be left to organize or can be drained according to clinical preference. Direct pressure to the drained area is sometimes helpful, but can also be difficult in some locations. A pressure stent sutured over the site or a firm bandage, where this is feasible, may limit extent and shorten recovery. A scar may be visible as distorted skin, firmly bound down to the underlying tissue. (Knottenbelt, 2003).

2.4.4. Contusion

A contusion is rarely a problem, extent where it involves structures other than skin. One of the commonest sites for contusion is the head (periorbital region) in horses that have severe colic. The damage around the eyes involves bruising and superficial grazing. Secondary effects include conjunctival edema (with protrusion). Contusions are usually managed by a combination of ice packs and prophylactic antibiotics. Healing is usually uneventful but some permanent scaring can occur (Knottenbelt, 2003).

2.4.5. Puncture Wound

Puncture wounds in the skin and hoof from sharp objects (e.g. nails, glass shards, or other foreign bodies) are common and potentially very serious. Puncture wounds may easily be overlooked or trivialized. The size of the wound often belies the potential severity of the injury. The skin defect is usually trivial by comparison to the deeper damage, which can even be fatal if it affects a vital organ such as the synovial structures of the foot, the cranium or body cavities and carries (anaerobic) infection into the wound. This type of wound proves the ideal anaerobic environment for *Clostridium tetani* organisms to flourish (Stashak, 2000; Knottenbelt, 2003).

Infection of the interstitial tissues and the lymphatic vessels is termed cellulitis and lymphangitis, respectively. In either case infection can spread extensively from the site of injury. The wounds may be difficult to explore effectively. Puncture wounds must be treated by scrupulous cleaning and, if necessary, widening of the injury to avoid anaerobic conditions. Antibiotics and non-steroidal anti-inflammatory drugs are usually used, but controlled movement s usually considered to be an important aid to be treatment. Ice packs and cold-hosing of the affected limb may be helpful. Healing of the skin wound is incidental and usually uncomplicated in all cases (Stashak, 2000; Knottenbelt, 2003).

2.4.6. Incised Wound

An incised wound (including a surgical wound) has a sharp defined margin and is caused by sharp metal or glass, flint, or occasionally the leading edge of a shoe. The skin is cut cleanly with minimal tearing and bruising of the wound margins. Injuries may extend into other structures, e.g. tendons and synovial sheaths; these are classified as complicated wounds. Some bleeding is common,

although reflex vasospasm limits instant blood loss. Therefore, there may be considerable hemorrhage associated with vasodilatation, especially if arteries are involved. Hemorrhage may be controlled by pressure bandaging or clamping/ligation of significant vessels. Treatment is straightforward: primarily closure by suture, adhesive, or simply by dressings (Knottenbelt, 2003).

2.4.7. Laceration

A laceration is a traumatic tearing of the skin in an uncontrolled direction. Lacerated wounds are common and multiple tears in the skin may be accompanied by bruising. Hemorrhage is rarely a problem. Healing is often difficult especially on the limbs. The prognosis is less favorable than for incised wounds, because tissue necrosis and sloughing are frequent complications (Knottenbelt, 2003; Stashak, 2000).

2.4.8. Complicated wound

Complicated wounds are probably the most common wound type in equine practice. The face and eyes, the breast, back and legs are most often involved from stable or grassfires (Knottenbelt, 2003). Wounds are amongst one of the commonest health concerns to afflict working donkeys (Curran *et al*., 2005; Pritchard *et al*., 2005; Biffa and Weldemeskel, 2006; Burn *et al*., 2007; Sells *et al*., 2009). In addition, studies of donkeys in Ethiopia have demonstrated that back sores and wounds are the most commonly observed health problem (Tesfaye and Curran, 2005).

2.5. Causes of Wound

The majority of wounds on Equines in developing countries are as a result of manmade causes, which is in contrast to the majority of wounds on equines in developed countries that are predominantly due to accidental injury. Wounds in working donkeys are seen on the legs, girth, tail, saddle and wither regions (Pritchard *et al*., 2005; Sells *et al*., 2009). These wounds are often caused by a combination of poorly fitting and designed pack or harnesses (badly fitted saddles, collars, hobbles and girths), beating with sticks, donkey bites and improper management practices which include over loading, improper position of load predisposing to falling, hyena bites and injuries inflicted by horned Zebu due to improper housing (DACA, 2006; Curran *et al*., 2005; Pearson *et al*., 2000).

A properly designed, well-fitted and comfortable harness allows the working animal to pull the equipment to the best of its ability without risk of injuries. A poorly designed or ill-fitted harness can cause inefficient transfer of power from the animal to the implement, and fatigue, discomfort or injury to the animal (Pearson *et al*., 2003). A badly fitted saddle will result in saddle sores and an ill fitted girth results in development girth galls. The hair will be rubbed off and a wound develops, which will become infected (Girma *et al*, 2014).

Biffa and Woldemeskel (2006) and Yilma *et al.,* (1991) suggested wounds in working equines of Ethiopia are mainly predisposed and caused by inappropriate harnessing. Over working and over loading in the donkeys have been reported to be the next leading causes of injury (Mekuria *et al.*, 2013). The high prevalence of infection-related injuries in donkeys suggests the microbial pathogens as either primary or secondary causes. A higher number of donkeys with lacerated wounds due to bite, and damages caused by barbed wire and other sharp objects were also reported to be common causes of lesions in donkeys in central Ethiopia (Biffa and Woldemeskel, 2006; Svendsen, 1997 and Bojia, 1996).

2.6. Wound Management

Anatomical knowledge is possibly the most important single aspect of wound management in donkeys. Many problematic wounds have recognizable anatomical complication that could have perhaps been fore seen at the outset (Girma *et al*., 2014).

The primary objective of wound management should be to encourage rapid progression from acute inflammation to repair without intervention of chronic inflammation which is a significant factor in the pathophysiology of wound healing failure. Wounds fail to heal because there is disruption of the normal delicate balance of growth factors and inflammatory mediators. Wounds should be managed in such a way as to restore the balance of healing processes without damaging any of the cells involved in healing (Girma *et al*., 2014).

2.6.1. Restraining

Restraining makes initial assessment and subsequent procedures far easier (Svendsen, 2008). Any wound in difficult equines and difficult wounds in any equines are best examined with the aid of

analgesia of the wound and/or sedation of the equines. In some cases, general anaesthesia is warranted (Caron, 1992).

2.6.2. Preparation of wound for detailed examination

Once the patient is adequately restrained, steps should be taken to minimize the risk of introducing or spreading contamination during detailed examination (Harrison, 1994).

Clipping and shaving the surrounding skin and hair is a source of contamination and adherent debris can obscure wound edges (Caron, 1992). Chemical disinfectants Some surgical scrub solutions have been shown to be cytotoxic and their use in exposed wounds is technically contra-indicated. However, handling of a wounded area should be considered and disinfection of the skin is necessary (Stashak, 1991).

2.6.3. Cleansing of wound

All wounds should be de-bulked of contaminants and devitalized tissue as thoroughly as possible, regardless of subsequent management. Soil, a common contaminant of equine wounds, has been shown to contain 'infection potentiating factors as well as micro-organisms (Stashak, 1991). Initially irrigation should be performed using a directed jet of fluid under pressure. Washing with wet sponges or low pressure delivery systems do not remove adherent particles or bacteria (Phillips, 1995).

Irrigation will not be fully effective at removing ingrained contaminants nor devitalized tissue. The continued presence of either impairs leukocyte function and promotes an anaerobic environment so impeding wound healing. Additional debridement is therefore mandatory and may be achieved by enzymatic or surgical means. The recently rejuvenated practice of applying maggots to a wound is based on the efficacy of their enzymatic secretions at digesting devitalized tissues (Knottenbelt, 2003). And suturing if needed (Stashak, 1991).

2.6.4. Dressing and bandaging of the wound

Coverings are wholly advantageous to wound healing; the only disadvantages concern cost and difficult application to proximal limb wounds. Benefits Include: Protection from trauma and contamination, Counter pressure to minimize swelling and fluid accumulation, immobilization, Pain

relief and increased temperature and local CO_2, which decreases pH thereby enhancing oxygen dissociation from haemoglobin (Girma *et al*., 2014).

2.6.5. Medication of the wound

It is generally best not to disturb the natural repair process by treating wounds with chemicals which may have as many deleterious effects as beneficial ones (Harrison,1994). In the early stages of wound management counter irritants, corticosteroids, antiseptics and all oil-based ointments should be avoided. Water soluble antimicrobial preparations may be an appropriate adjunct for dressing heavily contaminated or infected wounds. Systemically a broad spectrum regimen is then appropriate and bactericidal drugs are preferable. The contribution of anaerobic infection in complicated wounds may also need to be considered (Phillips, 1995).Tetanus vaccination/antitoxin should be ensured in all cases of wounding (Svendsen, 2008).

The major constraints in the management of wounds in donkeys are the need to examine and treat wounds within the first few hours after wounding occurs. The second limiting factor is that, under many practical circumstances, the working donkeys cannot be rested or hospitalized (Knottenbelt, 2003). A combination of necessity, poverty and ignorance means that many wounds presented long after the acute stages. Once complicating factors are presented, then the wound may pass into a continuing cycle of chronic inflammation and failure to heal as a result. Management becomes problematic and need for intensive treatment increases (Girma *et al*., 2014).

2.7. Wound Healing

Healing is a complex process that, for descriptive purpose, is arbitrarily divided into three temporally and spatially linked stages; Inflammatory and debridement phase (demarcation), repair phase (proliferation) and maturation phase (epithelialization) and contraction. Each phase has its local and systemic requirements and will, in turn, influence the others. The duration of the various phases is variable depending on the site of the wound, the case of the wound and the extent of tissue deficits (Knottenbelt, 2003).

2.7.1. Inflammatory and debridement (demarcation) phase

Blood and fibrin flow into the wound site and form a fibro-cellular clot, comprising mainly fibrin and fibronecting with the normal blood cells and meshed within it. The clot serves to limit blood loss and provides a scaffold for the formation of a new matrix that will facilitate the migration of cells. The migration of phagocytic cells is vital for the natural debridement of the wound. Foreign matter and bacteria are removed, and non-viable tissue is demarcating and gradually separated from the viable areas (Knottenbelt, 2003).

2.7.2. Repair (proliferative/granulation) phase

This usually commences in the first 12 hours; however, it cannot proceed until any remaining blood clots, necrotic tissue debris and infection have been eliminated. The process cannot proceed without a good blood supply; angiogenesis is critical to the health of the wound. Healthy sutured wounds are normally covered in 12-24 hours. Full thickness wounds only epithelialize after formation of a granulating bed, necessitating a lag phase of 4-5 days. Migration of fibroblasts and fibroplasia result in a major gain in tensile strength at 5-15 days in the sutured wound. Granulation tissue comprising of a loose extracellular matrix and increasing numbers of fibroblasts and vascular elements begins to develop 3-6 days post injury and continues until epithelialization occurs (Knottenbelt, 2003).

2.7.3. Maturation phase (Epithelialization and contraction)

Epithelialization is a very slow process in which the keratinocytes migrate centripetally; it starts within hours of wounding, but on the limbs proceeds at a maximum rate of around 1-1.5mm/10 days. The healing edge of a limb wound may only be visible after 10-14 days. Epithelialization is retarded by the presence of fibrin clot in the wound, and also by the products of chronic inflammation and death of polymorphonuclear leukocytes. The healing epithelium is fragile and thin and is poorly adherent to the underlying tissues. As the epithelium is restored and the underlying fibrous tissue and granulation tissue is remodeled, a scar is formed. Tension applied to the wound initiates scar strengthening along lines of force within the healing tissue. The scar regains only 80% of the original tissue tensile strength at one year; the new collagen is of a different type, which lacks the cross links of normal collagen. The scar gradually shrinks with decreasing vascularity until eventually it is comprised mainly of dense fabricates (Knottenbelt, 2003).

3. MATERIALS AND METHODS

3.1. Study Area

The study was conducted from October 2014 to April 2015 on randomly selected working donkeys from kebeles around Bahir Dar city (Meshenti and Yigodi). Bahir Dar is located in Amhara National Regional State North-western part of Ethiopia, at a distance of 565km from the capital, Addis Ababa. It is found between $12^0$29'N latitude and $37^0$29'E longitude with an average annual rain fall ranging from 1200mm to 1600mm annual temperature ranging from 8^oc to 31^oc. About 70% of the land is featured by plain plateaus and covered by various bush formation, low woods mainly ever green lands some semi-humid highland vegetation with major agricultural products like teff, wheat, maize and pulse crops.

3.2. Study Animals

The study has considered randomly selected donkeys irrespective of age, sex and BCS to investigate the prevalence of back sore in relation to improved pack saddle and associated risk factors. Donkeys play a major role in transportation sector in carrying water, harvested crops, and flours from grinding mill and any goods from and to markets.

3.3. Study Design and Methodology

A cross sectional study has been conducted to determine the impact of improved harness in the control of back sore in donkeys and associated risk factors.

3.3.1. Sample size determination and sampling technique

A total of 384 donkeys have been sampled randomly for physical examination from selected kebeles (Meshenti and Yigodi) especially those which are present at the kebeles' main market and grind mill houses as well as vet clinics. The sample size has been determined according to the formula given by Thrusfield (2005).

$$N = 1.962\ Pexp\ (1 - Pexp)/d2$$

Where, N= required sample size, P_{exp}= expected prevalence (50%), d= desired precision (5%), Z = 1.96 for 95% confidence interval.

3.3.2. Physical examination

Each randomly selected donkey has been physically examined for any external body injury, and findings including site, severity and class of wound have been recorded on a structured body mapping and physical examination sheet (Annex 3). Age and body condition score estimations have been made according to the method described by Sevendsen (1997) (Annex 1). Wound severity and classification estimation also made as indicated by Biffa and Woldemeskel (2006), and Knottenbelt (2003) respectively.

3.3.3. Questionnaire Survey

In addition to the direct physical examination each randomly selected donkey owner has been interviewed with a semi-structure interview (having both open and close questions) (Annex 3) to extrapolate information regarding owner's general information, donkey management practice (harnessing, feeding, housing, health care), working nature (duration of work, weight carried, length of journey covered, nature of working environment) and donkey-owner relationship.

3.4. Data analysis and presentation

Data both from the direct physical examination and questionnaire were properly coded and entered into Microsoft Excel-2007 spread sheet. The data was filtered for any invalid entry and then transferred to SPSS 16.0 version for windows package (2007) for statistical analysis. Descriptive statistics was made and differences (associations) in the prevalence of wound within each risk factor (independent variable) have been tested for significance through Pearson's Chi-square analysis at a probability level of 0.05. Results of the analysis are presented through illustrative figures and tables.

4. RESULT

Descriptive statistic for site, sex, age and body condition score of the sampled donkeys is illustrated in table 1 below.

Table 1. Descriptive statistics for site, sex, age and body condition score of physically examined donkeys.

Variable		Frequency (n)	Percentage (%)
Site			
	Meshenti	225	58.6
	Yigodi	159	41.4
Sex			
	Male	136	35.4
	Female	248	64.6
Age			
	Young(<2yrs)	28	7.3
	Adult (2-10yrs)	327	85.2
	Old(>10yrs)	29	7.6
BCS			
	Thin(BCS=1)	99	25.8
	Moderate(BCS=2)	214	55.7
	Ideal(BCS=3)	71	18.5

The overall prevalence of wound was 13.5% (n=52) from the 384 examined donkeys. Figure (1) below illustrates distribution of wounds on the body of examined donkeys.

Table 2. Over all prevalence of wound

		Frequency	Percent
Valid	Wounded	52	13.5
	No wound	332	86.5
	Total	**384**	**100.0**

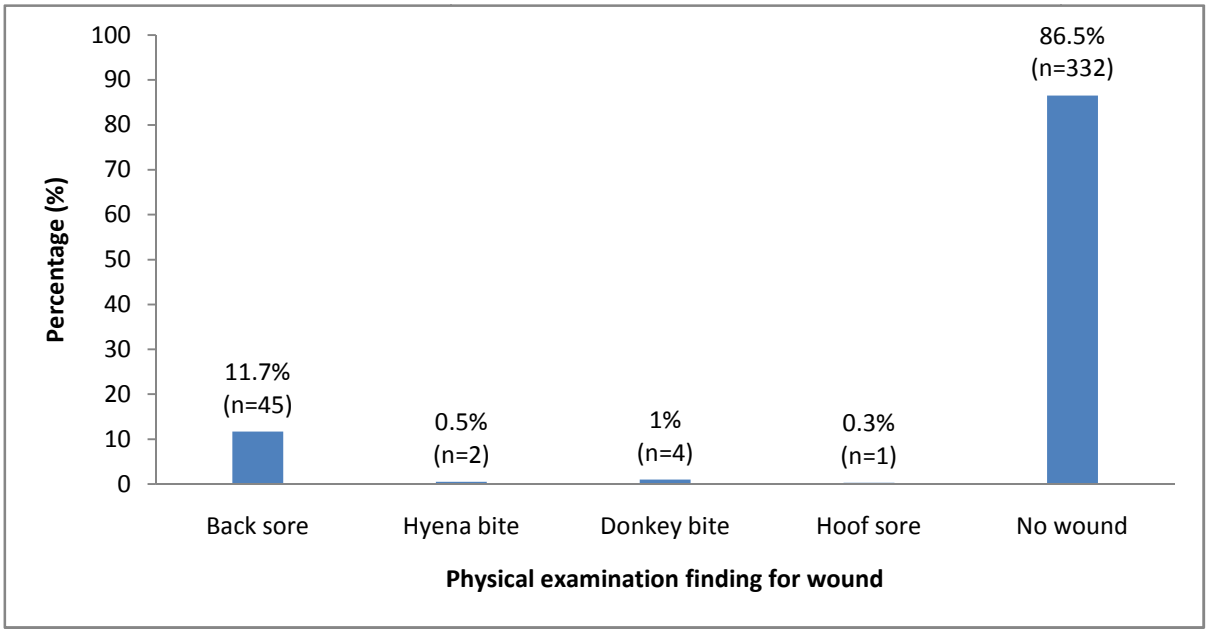


Figure 1. Distribution of wounds on the body of examined donkeys.

From the total 52 injured donkeys, back sore was found to have greater proportion (11.7%, n=45), followed by donkey bite (1%, n=4), hyena bite (0.5%, n=2) and hoof sore (0.3%, n=1).

The figure below indicates severity of wound. 77.6% (n=38) of the examined donkeys were with mild intensity of wound, while 12.2% (n=6) of them were having moderate wound and 10.2% (n=5) were severely wounded donkeys.

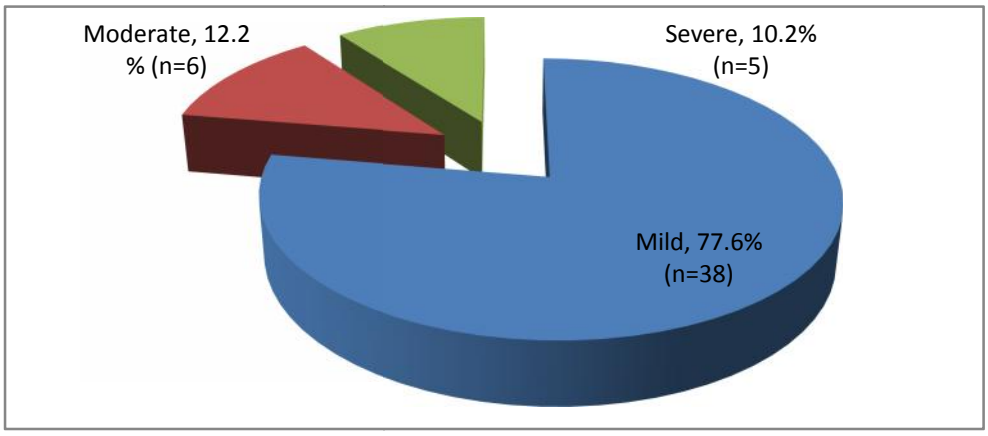


Figure 2. Relative severity of wound

Table 3. Wound prevalence among age, sex, BCS and site categories

		Examined donkeys(n)	Wounded donkeys (n)	Percentage (%)	P-value	Chi-square value/Fisher's exact test	OR (95 % CI)
Site (Kebele)							
	Meshenti	225	38	16.9	0.023	5.2	2.105
	Yigodi	159	14	8.8			
Sex							
	Male	136	23	16.9	0.153	2.043	1.537
	Female	248	29	11.6			
BCS							
	Thin(BCS=1)	99	19	19.2			
	Moderate(BCS=2)	214	27	12.6	0.109	4.428	
	Ideal(BCS=3)	71	6	8.5			
Age							
	Young (<2yrs)	28	0	0.0			
	Adult(2-10yrs)	327	50	15.3	0.032	6.832	
	Old (>10yrs)	29	2	6.9			

Note: OR is only for site and sex

From the above table there exists a significant difference in the prevalence of wound among donkeys in Meshenti and Yigodi Kebeles. Wound seems to be more common (higher) in donkeys from Meshenti Kebele compared to those in Yigodi. And by looking at the Odds ratio (OR), donkeys in Meshenti are two times at a greater risk of having a wound (injury) than those in Yigodi Kebele. Wound also had significant difference (p=0.032) in the age categories, in which adults are the most affected age group (15.3%, n=327), while old aged donkeys wounded with 6.9% (n=29) and youths with 0.0% (n=28). But the sex and BCS categories did not show any significant difference with wound.

Table 4. Wound prevalence and signs of illnesses

Instant sign of illness	Examined donkeys (n)	Wounded donkeys (n)	Percentage (%)	P-value	Chi-square value	OR (95% CI)
With signs of illness	188	37	9.7	0.001	11.857	2.96
No sign of illness	196	15	7.7			

This shows a good and an important significant difference between the prevalence of back sore and illness signs in working donkeys (9.7%, n=188; p=0.001, x^2=11.857).

Table 5. Sufficiency of pack saddle/padding use in back sore prevalence

Pack saddle/pad Used	Examined donkeys (n)	Wounded donkeys (n)	Percentage (%)	P-value	F = value
Fertilizer sac only	8	2	25		
Fertilizer sac + Straw	117	18	15.4		
Amhara Prototype	184	13	7.1	0.039	10.771
Leather	30	4	13.3		
Blanket	34	5	14.7		
No padding	11	3	27.3		

This is a quiet and interesting result indicating a significant difference in the prevalence of back sore among donkeys used with different types of pack saddles/pad.

Note: Here, it is tried to classify the out comes into three categories (Amhara Prototype/ Proper saddling, insufficient/poor saddling and no saddling) to make it easy and clear. This is based on characteristics of good packsaddle which are; 1) It should prevent heat (able to absorb sweat) and 2)

Comfortable and uniform distribution of the load (absorb pressure from the load). The insufficient packsaddle lucks one or all of the criteria; proper: - fertilizer sack filled with straw plus cloth/leather underneath (Amhara prototype), insufficient: - leather only, leather and cloth or cloth and no saddle.

Table 6. Back sore with padding having a uniform design compared to partitioned one.

Variable		**Examined donkeys (n)**	**Wounded donkeys (n)**	**Percentage (%)**	**P-value**	**Chi-square value/Fisher's exact test**	**OR (95% CI)**
Packsaddle use	No padding	11	3	27.3			
	Insufficient padding	189	29	15.3			
	Amhara prototype	184	13	7.1	0.010	9.094	
Design of packsaddle	Uniform	178	29	16.3	0.003	8.628	2.73
	Partitioned	195	13	6.7			

The above table shows that back sore has higher difference in donkeys used with padding having a uniform design compared to partitioned one.

Table 7. Prevalence of wound among average load weight and length of journey

Working nature		Examined donkeys (n)	Wounded donkeys (n)	Percentage (%)	P-value
Length of trip					
	< 5kms	152	17	11.2	P > 0.05
	5 - 10kms	107	19	17.8	
	10 - 15kms	34	4	11.8	
	> 15kms	91	5	5.5	
Load weight					
	<= 30 kgs	4	0	0.0	P > 0.05
	30 - 50 kgs	136	16	11.8	
	50 - 70 kgs	130	17	13.1	
	> 70 Kgs	114	12	10.5	

There is no any significant difference in the prevalence of wound among average load weight and length of journey covered.

The community's wound management practice when their donkeys gets wounded was appreciable, around 52.4% (n=198) people were seeking for veterinary help, while 16.1% (n=61) people were seeking for traditional healer and 31.5% (n=119) people were treat their donkeys by themselves.

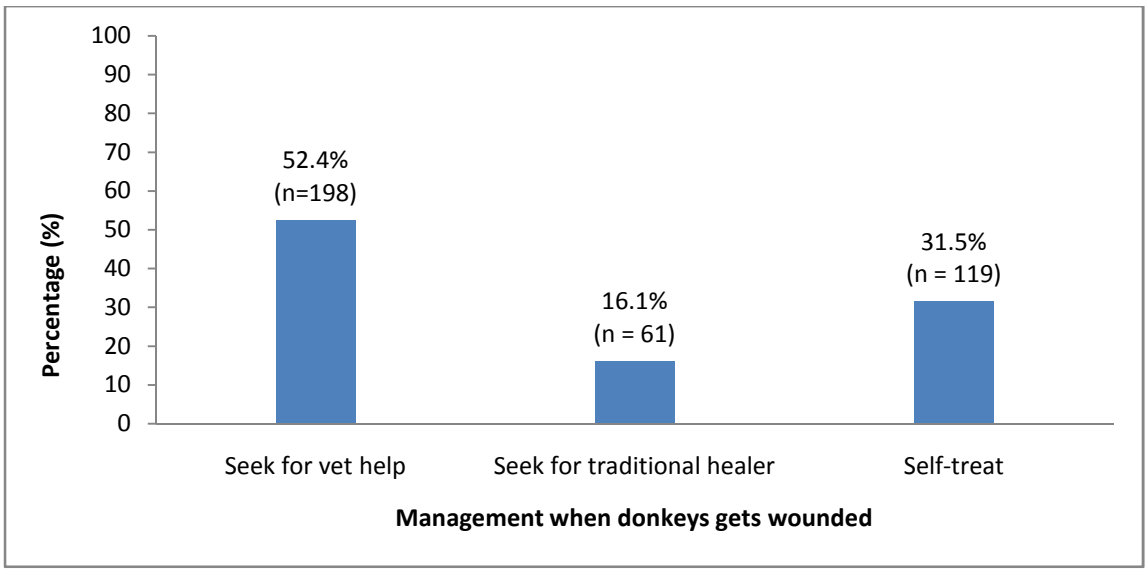


Figure 3. Wound management of the community

The table below shows the percentage of community perception about the change from the introduction of improved harness in five response groups.

Table 8. Impact of improved pack saddle on wound prevalence: community's perception

	Response	**Frequency (n)**	**Percentage (%)**
Communities' perception regarding positive change from the introduction of improved packsaddle.	Strongly agree	181	47.8
	Agree	56	14.7
	Do not know	142	37.5
	Disagree	0	0
	Strongly disagree	0	0
	Total	379	100.0

5. DISCUSSION

The aim of this research was to assess prevalence of back sore and its associated risk factors after the introduction of improved packsaddle designed by The Donkey Sanctuary Ethiopia, Amhara Project in working donkeys. By this the study confirmed that the prevalence, severity and risk factors of back sore in working donkeys.

The distribution of wound on examined working donkeys was mostly on the back area due to harnessing, on the neck area due to donkey bite and thigh area due to hyena bite. This might be due to poorly designed and ill fitted saddles manufactured by unskilled artisans or donkey owners. Tesfaye and Curran (2005) in Central Ethiopia and Biffa and Woldemeskel (2006) in South Ethiopia reported the same result. But the report done by Sells *et al.* (2010) in Morocco wound distribution mostly was on the withers, this difference might be due to the different design in saddle and strap.

Based on this research the prevalence of wound in working donkeys was 13.5%, out of this back sore account 11.7% which had significant association with saddling or padding. Most of this was due to insufficient and even ignorance of using of packsaddle (42.6%, n=200), but (7.1%, n=184) was found from donkeys used with improved packsaddle. This finding was markedly lower than the reported 54% in Morocco (Sells *et al.,* 2009), 59% in Jordan (Burn *et al.,* 2007), 77.5% (Curran *et al.*, 2005) and 79.4% (Biffa and Woldemeskel, 2006) in Ethiopia. This lower result was due to management system of the community with giving higher rest and application of improved packsaddle. Prevalence of wound had also depend on the design of the saddle, that the back sore has higher difference in donkeys used with padding having a uniform design compared to partitioned one.

In the current research severity of wound in most of the examined donkeys 77.6% (n=38) were with mild intensity of wound, while 12.2% (n=6) of them were having moderate wound and 10.2% (n=5) were severely wounded. But Biffa and Woldemeskel (2006) indicated that greater proportion of donkeys injured severely. The difference was might be due to differences in causes of wound, difference in saddle design or wound management system of the kebeles.

Based on the research wound prevalence had a significant difference with site of the two kebeles, Meshenti 16.9%, n=225 and Yigodi 8.8%, n=159; p=0.023, x^2=5.2 and OR=2.105. Wound prevalence also had significant difference (p=0.032) with the age categories, in which adults are the most affected age group (15.3%, n=327), while old aged donkeys wounded with 6.9% (n=29) and youths with 0.0% (n=28). Similarly Girma *et al* (2014) reported 22.9% of wound in young, 42.2% in adults and 46.3% in old donkeys. Similar scenarios were reported by Biffa and Woldemeskel (2006). This might be due to the fact that adults were involved in a wide range of activities. But wound did not show any significant difference with the sex and BCS categories.

According to the research working nature of the donkeys (i.e. average load weight and length of journey covered) did not show significant difference. In contrast of this idea Girma *et al* (2014) in Ethiopia and sells *et al.* (2010) in Morocco reported that wound prevalence had significant relationship with both average load weight and length of journey covered. The reasons for such non significant association might be due to donkeys in these kebeles were handled in the same management system and equal chance of getting wound regardless of type and design of padding that exposes donkeys from persistent irritation and reduced body condition.

Around half of the sampled donkeys showed illness like depression, colicky and diarrheic signs had a good and an important significant difference with the prevalence of back sore (9.7%, n=188; p=0.001, x^2=11.857).

The primary objective of wound management should be to encourage rapid progression from acute inflammation to repair without intervention of chronic inflammation which is a significant factor in the pathophysiology of wound healing failure (Knottenbelt, 2003). In Meshenti and Yigodi kebeles the majority of donkey owners (52.4%, n=198) seek for veterinary care whenever their donkeys get wounded and few owners (31.5%, n=119) managed their sick donkeys by themselves and the rest ones differently by allowing them to have access to traditional healers. This signifies the widely prevailing equine wound problem in the area. Pearson *et al.* (2000) reported the idea in contrast of my result in central Ethiopia where only a few people look for veterinary advice on treatment of back sores in donkeys.

The improved packsaddle (Amhara prototype) was widely distributed in the two kebeles (Meshenti and Yigodi) but most people 52.08% (n=200) did not use this packsaddle, the reason may be due to inability to afford the price or carelessness for their donkeys. Based on the above result application of improved packsaddle reduces the chance of getting back sore. The perceptions of the community regarding the change from the introduction of improved packsaddle designed by The Donkey Sanctuary Ethiopia, Amhara Project were positive. Around 47.8% (n=181) of people responded with strong agreement and 14.7% (n=56) had agreed, but 37.5% (n=147) people were with do not know response.

6. CONCLUSION AND R ECOMMENDATIONS

The study was mainly focused on back sore prevalence and the risk factors in relation to packsaddle application in two kebeles around Bahir Dar city. Age, pack type and design and sign of illness of donkeys were found as the major contributors to the occurrence of wound in working donkeys. Wound can affect the health condition, productivity and performance of animals. Pack saddle is largely responsible for this problem. So it is important to take care and prevent any wound caused by improper fitting or insufficient use of harness. The efficient use of working animals depends on how they are connected to the implement they are pulling or the materials they are carrying and how well they have been trained and managed. Based on the above conclusion the following recommendations were forwarded:

- Packsaddles should always be free from any injuring thorns.
- Replace poorly designed or old harness with a new one.
- Working animals should not be loaded beyond their capacity and while they are with ill signs.
- Wounded animals should be treated from vet clinics.
- Regular awareness creations to donkey owners on proper management and handling of donkeys should be in place.

7. REFERENCES

Anne, P., Catherine, M., Margaret, F., 2006. The future of working equines, Addis Ababa, Ethiopia. P.504-514.

Anne, P., Timothy, E, S., Rosina, K ., 2003. Harnessing and hitching donkeys, mules and horses for work. Department of Agricultur and Rural Engineering, University of Venda for Science and Technology, South Africa

Biffa, D., and Woldemeskel, M., 2006. Causes and factors associated with occurrence of external injuries in working equines in Ethiopia. *International journal of applied research.* **4**. P. 1–7.

Bojia, E., 1996. Epidemiology of epizootic lymphangitis in Ethiopia. Retrospective analysis, cross sectional study and treatment trial at Debre-Zeit and Akaki towns. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, debre zeit, Ethiopia.

Burn, C., Pritchard, J., Farajat, M., Twaissi, A., Whay, R., 2007. Risk factors for strap-related lesions in working donkeys at the World Heritage Site of Petra in Jordan. *Veterinary journal.* **178**. P. 263–271.

Caron, J., 1992. Management of superficial wounds. In: Equine Surgery. Philadelphia: Saunders.

Curran, M., Feseha, G., Smith, D., 2005. The impact of access to animal health services on donkey health and livelihoods in Ethiopia. *Tropical animal health and prodaction.***37**. P. 47–65.

DACA. (Drug Administration and control Authority), 2006. Standard treatment Guideline for veterinary practice of Ethiopia. P. 209-211.

Elisabeth, D., Svendsen, M.B.E., 2008 The profetional Handbook of the Donkey 4th ed. British. P.153-187.

Fisseha, G.A., 1991: Use of Equines in Ethiopia. P. 51-58 In: proceedings of the fourth livestock improvement conference held on 13-15 Nov 1991, institute of Agricultural Research, Addis Ababa, Ethiopia.

Girma, B., Mersha, C., Tewodros, T., Nahom, W., Anteneh, K., 2014. Incidence of wound and Associated Risk Factors in Working Donkeys in Yilmana Densa District.

Harrison, L., 1994. Punctured wounds of the equine foot. *In Practice.* **16**, P.294-300.

Knottenbelt, D., 2003. Handbook of equine wound management. London: *saunders*.

Mekuria, S., Matusala, M., and Rahameto, A., 2013. Management practices and welfare problems encountered on working equids in Hawassa town, Southern Ethiopia. *Journal of Veterinary Medicine and Animal Health.* **5**(9). P.243-250.

Owen, R., Singer, R., Clegg, D., Ireland, L. and Pinchbeck , L., 2012. Identification of risk factors for traumatic injury in the general horse population of north-west England, Midlands and north Wales. *Equine veterinary journal*. **387**, P.143-148.

Pearson, R., Mengistu, A., Agajie, T., Eleanor F., David G., Mesfin, A., 2000. Use and management of donkeys in peri-urban areas of Ethiopia, Draught Animal Power Technical Report 5, Scotland, University of Edinburgh: *Centre for Tropical Veterinary Medicine*.

Pearson, R., Simalenga, T., and Krecek, R., 2003. Harnessing and hitching donkey, horse and mule for work. *Center for Tropical vet. Med. universty of Edinburgh*. P. 34.

Phillips, J., 1995. Initial management of equine wounds: Part II equine veterinary education *Equine veterinary Education.***7**(4), P.193-198.

Pritchard, J., Lindberg, A., Main, D., Whay, H., 2005. Assessment of the welfare of working horses, mules and donkeys, using health and behavior parameters. *Preventive Veterinary Medicine*. **69**. P. 265–283.

Sells, P., Pinchbeck, G., Mezzane, H., Ibourki, J., and Crane, M., 2009. Pack wounds of donkeys and mules in the Northern High Atlas and lowlands of Morocco. *Equine veterinary journal*. 42(3). p. 219-226.

Slatter, D., 2002. Text book of small animal surgery. 3rd ed. Elsevier science, USA: *Saunders*.

Svendsen, E., 1997. The professional handbook of the donkey. *Parasites abroad. In:* 3rd ed. London: Whittet Books Limited.

Svendsen, E., 2008. The professional handbook of the donkey. 4th ed. London: Whittet Books Limited.

Stashak, Ted. S., 1991. Equine Wound Management. Philadelphia. Lea and Febiger. P. 145-162

Tesfaye, A., and Curran, M., 2005. A longitudinal survey of market donkeys in Ethiopia. *Tropical animal health and production.* **37**. P. 87–100.

Thrusfield, M., 2005**.** Veterinary Epidemiology. 3rd ed. UK: Blackwell Science. under clinical circumstances, *Equine veterinary Journal.* **34** (3). P. 270-273.

Waldron, R., and Pope, Z., 2002. Management of superficial wound. *In: text book of small animal surgery*. 3rd ed. Philadelphia: Saunders.

Wilmink, J., Vanherten, J., Nederbragt, H., Van Weeren, R., and Barneveld, A., 2002. Retrospective study of primary intention healing and sequestrum formation in horses compared to ponies under clinical circumstances, *Equine veterinary Journal.* **34** (3). P. 270-273.

Yilma, J., Feseha, G., Svendsen E., Mohammed, A., 1991. Health problems of working donkeys in Debre-Zeit and Menagesha regions of Ethiopia. In: Proceedings of a Colloquium on Donkeys, Mules and Horses. Scotland, University of Edinburgh: *Centre for Tropical Veterinary Medicine.* P.151-155.

8. ANNEXES

Annex 1. Body condition scoring system and aging

Body condition assessment was done by examining the animal from all sides without touching it. The equids' body condition was scored as 0 to 5 (0 = very thin; 1 = thin, 2 = moderate, 3 = good (ideal), 4 = fat and 5 = very fat). However, for the purpose of data analysis, body condition 0 to 5 was assigned to three distinct groups: Categories 0 and 1were grouped as "thin'', category 2 grouped as "moderate" and category 3, 4 and 5 were categorized as "ideal".

Table 9. Descriptions of body condition scores

BCS	Description
Grade 1	Very poor, emaciated, ribs spines and tuber coxae very prominent, coat dull
Grade 2	Below avderage, spine prominent, coat dull
Grade 3	Average, good spinous process palpable but not prominent. Cool and skin generally in good condition
Grade 4	Above average, very good spinous process not easily palpated well muscled coat shiny skin in fact over fat.
Grade 5	Excellent body well rounded with generous muscle and fat cover spinous process non palpable, coat shiny in fact over fat

Source: Sevendsen (1997).

Table 10. Age category and its descriptions

Age	Description
3 years old	First pair of adult teeth has grown and is in wear
4 years old	2nd pair of adult teeth is up and in wear. One pair of baby teeth is left.
5years old	3rd (corner) pair of adult teeth is up and is wearing down at the front.
6years old	the teeth have worn level and all have a central indent called a cup. The corner teeth are now wearing level.

7 years old	The cup is less deep in the central pair of front teeth, where it is now called a mark. There is still a good cup in the other front teeth. At seven years, a hook can be seen on the side of the upper corner front teeth.
8 years old	A dark line at the front of the teeth (called a star) has appeared on each of the central pair of front teeth.
9 years old	Tow no more cups, only marks. Stars have appeared on the next teeth. A groove begins to grow down the upper corner front tooth.
10 years old	The biting surfaces are more triangular. The star has appeared on corner front teeth. Stars are becoming more round and neater the middle of the tooth. Marks are less distinct. The seven year hook has worn away.
12 years old	The mark has gone from the centrals. Stars are now round. The groove in the upper corner teeth is about one centimeter long.
15 years old	Only stars on the teeth. The groove is now half way down the upper corner teeth.
19-20 years old	Seen from the side, the teeth have a forward slope. The groove extends down the whole tooth.
20-25 years old	The teeth have an even more forward pointing angle and the groove is growing out (it disappears at about 30 years old). The tops of the now have a more triangular shape.

Source: Sevendsen (1997).

Annex 2. Operational Definitions for wound intensity and classification

Severe: when there was ulceration involving a pronounced contusion in wider areas, tissue hypertrophy, and severe complication.

Moderate: wounds involved coalition of small wounds with tissue sloughing involving no complication and hypertrophy, and some with chronic courses.

Mild: when they involve only loss of epidermis and the superficial layer with no further trauma.

Soures: Biffa and Woldemeskel (2006).

Infected wound: when the wound begins to drain yellow or greenish fluide (pus) or skin around the wound becomes red, warm, swollen, or increase singly painful and when its occurrence of wound is beyond 8 hours.

Fresh wound: wound without inflammatory signs and which come early after the injury 8 hours after its occurrence.

Soures: Knottenbelt (2003).

Annex 3. Physical examination and questioner

ASSESSMENT ON THE IMPACT OF IMPROVED HARNESS IN THE CONTROL OF BACK SORE IN DONKEYS AROUND BAHIR DAR CITY

PHYSICAL EXAMINATION SHEET

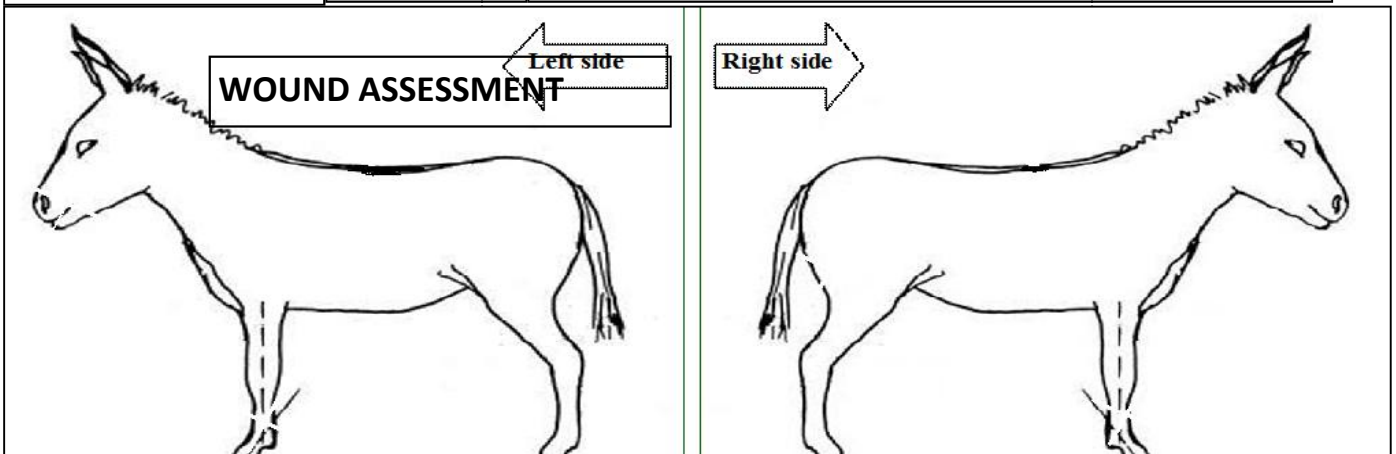
THE DONKEY SANCTUARY

ID:	DISTRICT: _____	KEBELE: _____

ANIMAL DETAIL:

SEX: ☐ Male ☐	**BCS:**	**AGE: _____; ☐ 0-5 ☐ 6—10 ☐ 10—15 ☐**

WOUND ASSESSMENT



SITE OF WOUND

□ Bit sore □ Back sore □ Breast sore □ Chest sore □ Tail sore □ Proud flesh □ Hobble sore
□ Hyena bite □ Mule bite □ Bird Bite □ Hoof sore (penetration)

WOUND CLASSIFICATION: □ Fresh □ Infected

INTENSITY OF WOUND: □ Mild □ Moderate □ Severe

OTHER FINDINGS

Ectoparsites (ticks infestation, mange mites; gasterophilus eggs; fly itch); habronemiais; sarcoid, dermatophilosis, dermatitis, ascites, photosensitization; branding, alopecia;

INSTANT BEHAVIOUR

□ Alert

□ Depressed (ear dropped)

□ Tail tuck (donkey)

□ Nervousness

□ Difficult to catch / handle

□ Other odd signs

LAMENESS ASSESSMENT

□ Posture and gait abnormality □ Hoof over growth □ Hoof deformity □ HPA [Broken forward broken backward] □ Cracking, chaffing □ Arthritis, hygroma, dislocation □ Puncture wound on hoof sole □ Abandoned (fracture, hoof loss, tendon…) □ Apparently lame

OTHER SIGNS OF DISEASE

□ Diarrhea □ Colicky signs □ Pneumonia /cough /Aspir □ Rectal prolapse □ Paraphimosis /phimosis □ Ocular discharge /problem □ Nasal discharge □ Abnormal mucous mem. □ Dehydrated (skin tent) □ Rough coat □ Tetanus □ Strangles □ Epizootic lymphangitis □ African Horse Sickness

□ Dystocia Other

CODE: _____

QUESTIONNAIRE FORMAT

OWNER'S DETAIL

1. **NAME:** 2. **DISTRICT:** 3. **K/PA** 4. **SEX:** □ MALE □ FEMALE 5. **AGE:**

I. HARNESSING EXPERIENCE (*Support by observation*)

1. Type of pack saddle used : □ Fertilizer sac only □ Fertilizer sac + Straw □ Fertilizer sac + Jut sac + Straw □ Leather □ Blanket □ No padding (Amhara Prototype)
Other _____
2. Design of pack saddle used : □ Uniform □ Partitioned
3. What kind of strap do you use? A. Sisal rope B. Nylon rope C. Rope made from fertilizer sac D. Rope made of mosquito net E. Leather F. Cotton cloth

II. WORKING NATURE

1. What do you regularly transport by your donkey? □ Flour from grind mill house □ Construction materials □ Water □ Wood □ Multiple □ Other _____
2. On average how much weight do you load on your donkey? _____ **Kgs**
□ ≤ 30 kg □ > 30 - ≤ 50 kg □ > 50 - ≤ 70 kg □ >70 kg
4. On average how long does your donkey travelled in a day carrying load? □ < 5kms □ 5-10kms □ 10-15kms □ >15 kms
5. In what position do you usually place a load on your donkey? □ Horizontal □ Parallel

III. MANAGEMENT

7. What is your experience of feeding your donkey?
   A. Only grazing [Adequate field grazing, poor field grazing**,** homestead grazing]
   B. Supplementary feeding **[**hay, crop residue**,** local beer residue, cereals**,** Other (specify)]
8. How frequent do you feed your donkey? A. Once per day B. Twice per day C. Three times per day D. > 3 *times*
9. When do you feed your donkey? A. Before loading B. In between while going to market C. After loading
10. Frequency of watering your donkey per day? A. Once B. Twice C. Three times D. More than three times
11. How do you keep your mule off work? A. Tethering B. Hobble C. Let loose
12. What do you use for tethering or hobbling? A. Sisal rope B. Lynen rope C. Rubber E. Wire D. Rope made of mosquito net E. Have no experience
13. Donkeys are well handled through beating. Do you agree? (*Support with observation*)
    A. Agree B. Disagree C. No response ; If you disagree how do you communicate with your donkey
    A. Naming B. Feeding C. Grooming
14. What would you do if your donkey gets wounded**? (**What have you done so far to improve the wound problem) "*if already wounded"*
    □ Seek for vet. help □ Seek for traditional healer □ Self treat □ Abandoned to heal by itself
15. Wound by itself is enough reason to rest a donkey? □ Agree □ Disagree □ Not sure

16. Do you agree there is a change after the introduction of improved harness? Strongly agree agree do not know disagree strongly disagree reason…….

9. DECLARATION

I, the under signed, declare that the information presented here in my thesis is my original work , has not been presented for degree in any other university and that all source of materials used for the thesis have been duly acknowledged.

Name: Jemal Endriss

Signature: _____

Date of submission: _____

This thesis has been submitted for examination with my approval as university advisor

Name

Mersha Chanie (DVM, MSc; Associate professor of pathology)

Signature: _____

Tewodros Tesfaye (DVM, MSc; Assistant professor of physiology**)**

Signature: _____

Girma Birhan (DVM; MSc Candidate)

Signature_____